

WHAT IS CLAIMED IS:

1. An apparatus for fabricating a plastic optical fiber, comprising:

a first container for separately containing refractive index control materials
5 including at least a core material, the refractive control materials having different refractive indices;

a second container for containing a clad material having a different refractive index from the core material;

a crosshead for receiving and extruding the refractive index control materials and
10 the clad material introduced from the first and second containers in a downward direction, the flow of the refractive index control materials and clad materials being restricted to a predetermined radius; and,

a rotator for mixing the extruded refractive index control and clad materials concentrically in perpendicular to an extrusion direction.

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2. The apparatus of claim 1, wherein the crosshead comprises:

a core tube for receiving the respective refractive index control materials;

a crosshead housing having a channel formed therein for allowing the clad material to be injected therethrough; and,

20 a die holder for restricting the flow of the refractive index control and clad materials to the predetermined radius.

3. The apparatus of claim 2, wherein the rotator comprises:

a nozzle detachably engaged with the crosshead; and

a rotational force supply for rotating the nozzle.

5 4. The apparatus of claim 4, wherein the nozzle is up to 50cm long.

5. A method of fabricating a plastic optical fiber, comprising the steps of:

continuously providing one or more refractive control materials including at least a
core material, the refractive control materials having different refractive indices;

10 continuously providing a clad material having a refractive index from the
refractive index control materials around the refractive index control materials;

extruding the refractive index control materials and the clad material at a
predetermined radius;

mixing the extruded refractive index control material and clad material
15 concentrically in perpendicular to an extrusion direction; and,

drawing a plastic optical fiber from the mixture.

6. The method of claim 5, wherein the core material is provided at the center

and the other refractive index control materials are provided around the core material in the

20 refractive-index-control-material providing step.

7. The method of claim 5, wherein the clad material is a polymer obtained by polymerizing at least one monomer.

8. The method of claim 5, wherein a refractive index $n(a-b)$ between an area
5 spaced from the center of the plastic optical fiber by “a” and an area spaced from the center of the plastic optical fiber by “b” ($a \geq b$) is expressed as:

$$n(a-b) = n_{\text{BASE}} + \sum (n_i - n_{\text{BASE}}) r_i^2 / \pi(a^2 - b^2)$$

wherein n_i represents the refractive index of an i th refractive index control
10 material, r_i represents the radius of the i th refractive index control material, and n_{BASE} represents the refractive index of the clad material.

9. An apparatus for fabricating a plastic optical fiber, comprising:
a core material container for containing a core material;
15 a clad material container for containing a clad material having a different refractive index from the core material;
a crosshead for receiving and extruding the core material and the clad material introduced from the containers, the flow of the core and clad materials being restricted to a predetermined radius; and,
20 a rotator for mixing the extruded core and clad materials concentrically perpendicular to an extrusion direction.

10. An apparatus for fabricating a plastic optical fiber, comprising:
- a core material container for containing a core material;
 - a refractive index control material for containing a refractive index control material by which the refractive index of a core is controlled;
 - 5 a clad material container for containing a clad material having a different refractive index from the core material;
 - a crosshead for receiving and extruding the core material, the refractive index control material, and the clad material introduced from the containers, the flow of the core, refractive index control, and clad materials being restricted to a predetermined radius; and,
 - 10 a rotator for mixing the extruded core, refractive index control, and clad materials concentrically perpendicular to an extrusion direction.